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Book Review

The Evidence for Evolution in 100 Pages

A review of Alan R. Rogers, *The Evidence for Evolution*. University of Chicago Press: Chicago, 2011, 128 pp., US\$45.00, ISBN-13 978-0226723822 (paperback).

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In *The Evidence for Evolution*, University of Utah anthropologist Alan R. Rogers provides a concise and readable summary of several of the most important classes of evidence that support Darwin's theory of evolution by natural selection. *The Evidence for Evolution* appears to be intended for an audience of college-educated individuals who have been introduced to science. In the introductory chapter, however, Rogers comments that, "[Scientists] tend to emphasize what we find interesting and to gloss over the rest...[S]tudents learn a lot about the mechanisms of evolution but only a little about the evidence that evolution really happens" (pp. 3-4). This comment suggests that Rogers's intended audience includes people who have completed a university course in evolution that did not provide an adequate summary of the evidence for evolution. Rogers's audience therefore appears to include two groups. The first group includes college-educated people interested in learning about the evidence for evolution. The second group includes students in university courses addressing the theory of evolution. If such courses do not provide an adequate account of the evidence for evolution, Rogers's book is an excellent supplement.

A notable feature of *The Evidence for Evolution* is that it is just over 100 pages of text. Rogers thus presents a remarkably concise account of the evidence for one of the most important theories in science. Following, we review briefly the strengths of Rogers's overview of the evidence for evolution, discuss the value of a concise presentation of the evidence for evolution, and highlight potential shortcomings of the book. We compare *The Evidence for Evolution* to recent books that have presented the evidence for evolution, including Richard Dawkins's (2009) *The Greatest Show on Earth* and Jerry Coyne's (2009) *Why Evolution is True*.

The Evidence

It might be assumed that a body of work that sacrifices in length will also sacrifice the full measure of the intended message. This is not the case with *The Evidence for Evolution*. In

each of the 10 chapters, Rogers follows a strategic formula according to which he presents a different body of evidence for evolution. The evidence that Rogers presents includes discussions of speciation, the fossil record, how complex adaptations arise, tracing ancestry and descent, biogeography, and genetics. It is impressive that so many fields of evolutionary science are so thoroughly presented in such a brief volume. For example, in chapter 3 (“Does Evolution Make Big Changes?”), Rogers’s description of how transposon markers in DNA can be used to identify the evolutionary relationships among species is stellar, and especially so considering that the discussion is just 15 pages.

At first glance, it appears as if Rogers is handicapping himself by not expanding the length of the book to allow for more detailed discussion. Upon further inspection, however, Rogers did not need additional space to describe the evidence for evolution. He successfully presents some of the most convincing evidence for evolution in hardly 100 pages. This allows for the book to be more accessible to a wider range of readers. Rogers does assume that his audience is well-versed in information about DNA and about the mechanisms of evolution. This fact, as well as the format according to which Rogers frames the chapters, is what allows him to write a book that is at once readable and remarkably concise.

In each chapter, Rogers presents a problem that needs to be examined if evolution is true, gives background information about the particular area of research, and then showcases the empirical evidence that supports evolution. For example, Rogers opens chapter 3 (“Does Evolution Make Big Changes?”) by presenting a “challenge” to the fact of evolution posed by creationists. The challenge takes the form of the “Argument from Incredulity,” and expresses disbelief at how whales could have evolved from land animals. Rogers tackles this challenge with two different types of evidence. The first type of evidence is showcased by taking the reader on a breathtaking tour of fossils through the history of the evolution of the whale. Rogers presents a series of fossils that display the progressive steps that a species of land animal traversed en route to becoming a species of water-dwelling animal.

The second type of evidence that Rogers uses to document that whales evolved from land-based ruminants includes phylogenetic trees built using transposon data. Transposons are rare stretches of DNA that are unlikely to be shared by two species unless they have a common ancestor. By comparing transposon markers across multiple species, it is possible to create detailed and stunningly consistent phylogenetic trees that display the relationships between these species. In the case of whales, they share transposon markers with other ruminants, such as cows, deer, and their closest relative, the hippopotamus. The evolutionary relationships revealed by these phylogenetic trees match those indicated by the fossil evidence and by morphological similarities between species.

Shortcomings

A potential shortcoming of *The Evidence for Evolution* is contained in chapter 5, “Peaks and Valleys.” Here Rogers spends one-tenth of the book discussing what strikes us as a relatively trivial controversy in evolutionary science. In his conclusion to this chapter, Rogers (p. 62) states, “We saw...that complex adaptations *can* evolve via a series of small, individually advantageous changes. No valley need be involved at all. *Many* evolutionists would argue that this is the whole story — that all adaptations evolve in this way” (italics added). Although there might be some disagreement over the details regarding the possibility of crossing “adaptive valleys,” this disagreement is comparatively insubstantial and certainly does not challenge the fact of evolution. By spending precious space on this issue, Rogers might give the impression to

readers unfamiliar with the evidence for evolution (a likely target audience) that the possibility of adaptive valleys represents a substantial point of disagreement among evolutionary scientists. As an aside, it is also not clear why Rogers comments that “complex adaptations *can* evolve via a series of small, individually advantageous changes” (italics added), when indeed they *must* have evolved by such a gradual process.

Another potential shortcoming is Rogers’s treatment of creationists. Throughout the book, Rogers uses creationist arguments as starting points in presenting new lines of evidence for evolution. Rogers is unnecessarily respectful of these creationist arguments, however. Although he does dispatch them, Rogers treats creationist arguments as worthy of discussion alongside the evidence for evolution. In a book aimed at presenting the evidence for a scientific theory, creationists or any other non-scientific group should be referenced as nothing more than politically or religiously motivated individuals with an ignorant axe to grind.

Comparisons with Recent Books

Richard Dawkins’s (2009) *The Greatest Show on Earth* and Jerry Coyne’s (2009) *Why Evolution is True* are two recent, critically acclaimed and commercially successful accounts of the evidence for evolution. *The Greatest Show on Earth* is not just a description of the evidence for evolution. The book includes Dawkins’s characteristic musings about evolution and his vicious attacks on creationists and other “history-deniers.” Dawkins’s masterful approach involves more than a focused presentation of the evidence for evolution. He attacks opponents to evolution and elaborates in beautiful prose how the evidence for, and mechanisms of, evolution renders moot a “grand choreographer” (Gorelik & Shackelford, 2010). But Dawkins’s book is also over four times the length of *The Evidence for Evolution*, perhaps making it less attractive as a supplement to a standard evolution textbook. *Why Evolution is True* also is a wonderful account of the evidence for evolution, but Coyne spends much more time elaborating the devastating implications for creationist arguments beloved by ignorant, religious Americans. Although *Why Evolution is True* is a majestic account of the evidence for evolution, Coyne’s discussion of evolutionary psychology reveals profound misunderstandings of that discipline (Liddle & Shackelford, 2009). Rogers’s *The Evidence for Evolution* is different from these books in that it is meant to be a brutally concise description of just a few of the most important facets of the evidence for evolution.

Conclusion

Alan R. Rogers’s *The Evidence for Evolution* is a well-written and impressively concise presentation of the evidence for evolution. Rogers presents the evidence for evolution in a way that is easy to read and in a relatively brief time period, especially for readers with previous knowledge of the theory of evolution and of biological science. *The Evidence for Evolution* is a fine book to recommend to people who are interested in learning about the evidence for evolution, but it might serve best as a stepping-stone to other books that cover a broader array of topics and issues, and in greater depth [e.g., Dawkins (2009) and Coyne (2009)]. *The Evidence for Evolution* also could be assigned as a supplement in university courses that employ a standard textbook addressing the theory of evolution but which shortchanges the student on a presentation of the evidence.

References

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